

AMENDMENTS TO THE CLAIMS

Claims 30-47, 61, and 62 are pending in the present application. This listing of claims will replace all prior versions and listings of claims in the application. Claims indicated as previously added were added in the Amendment filed August 5, 2003.

Listing of Claims

Claims 1 – 29 (Previously canceled).

30. (Currently amended) A catalyst composition comprising the product resulting from the combination of

a) a non-fluorinated chromium catalyst having a pore volume of at least 1.8 cc/g and a surface area of at least 400 m²/g produced by contacting a chromium-containing, titanium-containing, silica-containing solid with carbon monoxide under conditions such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide; and

b) a cocatalyst selected from i) alkyl lithium or aryl lithium compounds; ii) dialkyl aluminum alkoxides in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof; or iii) mixtures thereof.

31. (Previously added) A catalyst composition according to claim 30 wherein said cocatalyst comprises an alkyl lithium compound.

32. (Previously added) A catalyst composition according to claim 31 wherein said alkyl lithium compound has 1 to 12 carbon atoms.

33. (Previously added) A catalyst composition according to claim 31 wherein said alkyl lithium compound has 1 to 5 carbon atoms.

34. (Previously added) A catalyst composition according to claim 33 wherein said alkyl lithium compound comprises n-butyl lithium.

35. (Previously amended) A catalyst composition according to claim 34 wherein the alkyl lithium compound is used in an amount so as to give an atom ratio of lithium to chromium in the range of about 0.5:1 to 10:1.

36. (Previously added) A catalyst composition according to claim 34 wherein the chromium catalyst contains about 0.5 to about 5 weight percent chromium and about 0.1 to 7 weight percent titanium.

37. (Previously amended) A composition according to claim 30 wherein said lithium compound is used in an amount so as to give an atom ratio of lithium to active chromium catalyst component within a range of about 0.5:1 to about 10:1.

38. (Previously added) A composition according to claim 30 wherein the chromium catalyst is prepared by calcining a chromium-containing, titanium-containing, silica-containing solid with oxygen at a temperature in the range of about 400 to about 900 degrees C to convert a substantial portion of the chromium to the hexavalent state and then contacting the calcined

product with carbon monoxide at a temperature in the range of about 300 to about 500 degrees C to convert a substantial portion of the chromium to the divalent state.

39. (Previously amended) A composition according to claim 30 wherein said cocatalyst is a dialkyl aluminum alkoxide in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof.

40. (Currently amended) A composition according to claim 39 wherein said at least one alkyl compound is an alkyl zinc compound.

41. (Previously added) A composition according to claim 40 wherein said alkyl zinc compound is diethyl zinc.

42. (Currently amended) A composition according to claim 39 wherein said at least one alkyl compound is an alkyl aluminum compound.

43. (Previously added) A composition according to claim 42 wherein said alkyl aluminum compound is triethyl aluminum.

44. (Currently amended) A composition according to claim 39 wherein said at least one alkyl compound is an alkyl boron compound.

45. (Previously added) A composition according to claim 44 wherein said alkyl boron compound is triethylboron.

46. (Currently amended) A dual catalyst composition comprising:

1) a polymerization catalyst system comprising a chromium catalyst composition resulting from the combination of

a) a non-fluorinated chromium catalyst having a pore volume of at least 1.8 cc/g and a surface area of at least 400 m²/g produced by contacting a chromium-containing, titanium-containing, silica-containing solid with carbon monoxide under conditions such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide; and

b) a cocatalyst selected from i) alkyl lithium or aryl lithium compounds; ii) dialkyl aluminum alkoxides in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof; or iii) mixtures thereof; and

2) a Ziegler-Natta catalyst composition produced by combining a halide of a metal selected from titanium, vanadium, or zirconium and an organoaluminum compound.

47. (Currently amended) A catalyst composition according to claim 46 wherein the organoaluminum of the Ziegler-Natta catalyst composition comprises a triethylaluminum compound.

Claims 48 – 60 (Previously canceled).

61: (Currently amended) A catalyst composition comprising the product resulting from the combination of:

a) a non-fluorinated chromium catalyst having a pore volume of at least 1.8 cc/g and a surface area of at least 400 m²/g; and

b) a cocatalyst selected from i) alkyl lithium or aryl lithium compounds; ii) dialkyl aluminum alkoxides in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof; ~~and~~ or iii) mixtures thereof;

wherein the chromium catalyst consists essentially of a chromium-containing, titanium-containing, silica-containing solid that has been contacted with carbon monoxide under conditions such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide.

62. (Currently amended) A catalyst composition comprising the product resulting from the combination of:

a) a chromium catalyst having a pore volume of at least 1.8 cc/g and a surface area of at least 400 m²/g produced by contacting a chromium-containing, titanium-containing, silica-containing solid with carbon monoxide under conditions such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide; and

b) a cocatalyst selected from i) alkyl lithium or aryl lithium compounds; ii) dialkyl aluminum alkoxides in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof; ~~and~~ or iii) mixtures thereof;

wherein the chromium catalyst is ~~substantially free of fluorine~~ a non-fluorinated catalyst.